Autoregressive Modeling of Polar Motion Excitations

K S Hamdan ; R S Gross; D H Boggs; A P Freedman (Jet Propulsion laboratory, California Institute of Technology, 4800 Oakgrove Drive, Pasadena, CA 91109; p h. 818-354-3940; e-mail: Kamal.Hamdan@jpl.nasa.gov)

In this presentation, a general stochastic model for Polar Motion and its excitation, known as the Effective Angular Momentum (EAM) function, will be proposed, and the corresponding Kalman filter model will be derived. This stochastic model consists of an arbitrary sum of complex-valued autoregressive moving average (ARMA) processes, each characterizing different pro.grade and retrograde frequency bands. This general formulation of the Kalman filter allows for experimentation and variability in choosing different stochastic models for EAM functions. The models in turn depend on the **frequency band** one wishes to model accurately.

Based on the general formulation, several models for the EAM functions were derived from multi-taper spectral analysis of EAM time series obtained by deconvolving GPS Polar Motion data and the SPACE 94 Polar Motion series (Gross 1995). The candidate models were compared based on their ability to predict Polar Motion and the corresponding EAM functions up to 30 days in the absence of data. Of particular interest is an EAM model which consists of the sum of a complex-valued AR1 process and two complex-valued AR2 processes, the latter corresponding to annual and semiannual harmonic components.

1. 1995 Fall Meeting

2. 00429739

3. (a) K Hamdan
    Jet Propulsion laboratory,
    4800 Oakgrove Drive,
    MS 238-332
    Pasadena, CA 91109 USA
    Kamal.Hamdan@jpl.nasa.gov

   (1)) 818-354-3940

   (() 818-393-6890

4. G

5. (a)
   (b) , ,
   (c)

6. P

7. O% published elsewhere

8. Charge $50 to Kamal S Hamdan
    MC card 5329023099008851,
    expires 12/31 /97

9. C

10. No special instructions

11. Regular author